Robot Programming #4

디지털 입력

Dept. of Mech. Robotics and Energy Eng.
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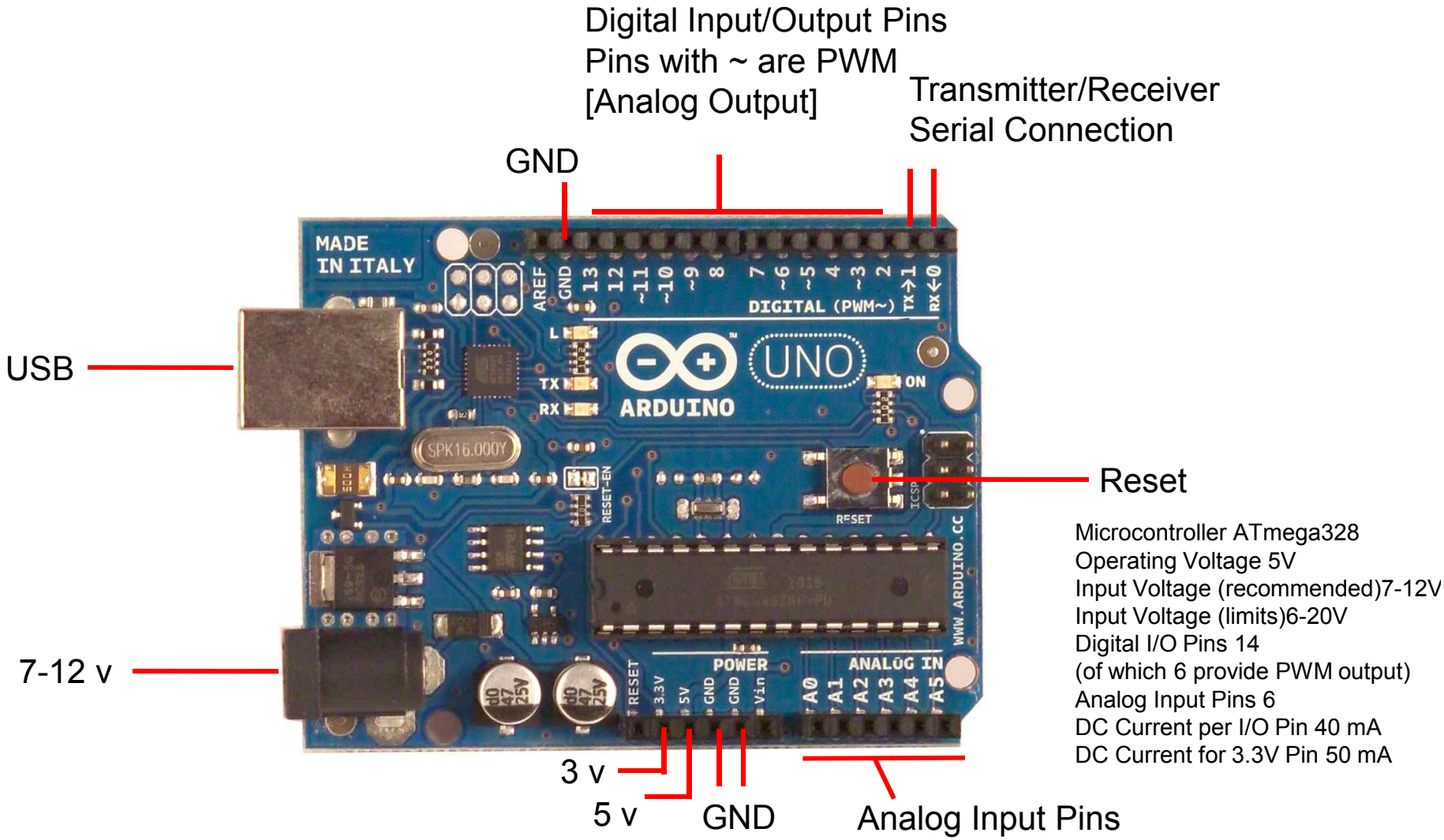
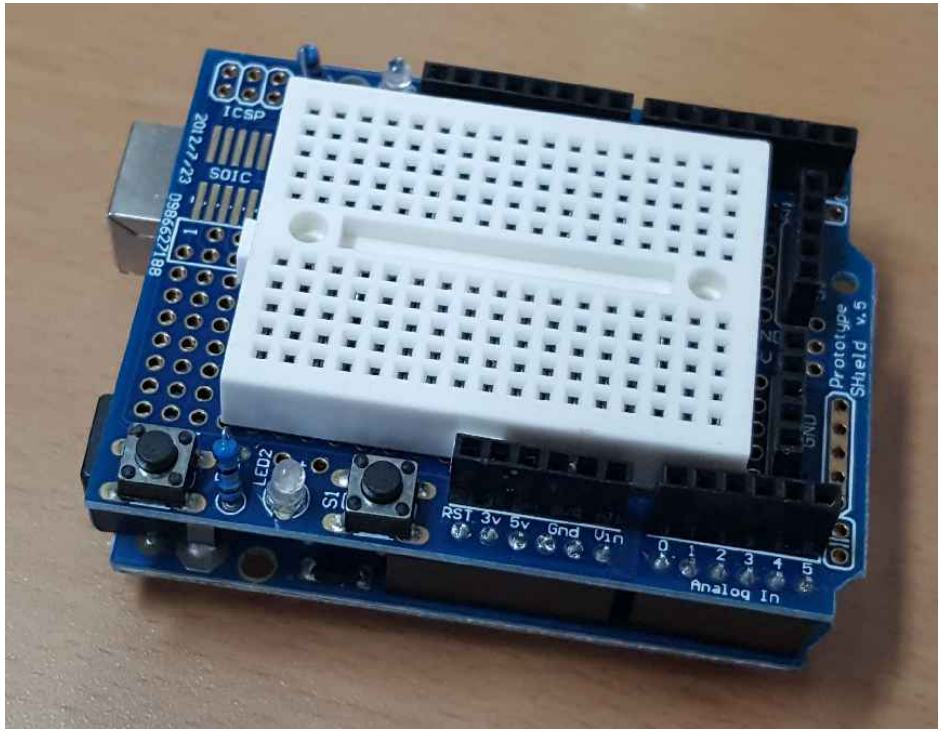
Arduino Uno


Digital Input/Output Pins
Pins with ~ are PWM
[Analog Output]
Transmitter/Receiver
Serial Connection
GND
USB
Reset
7-12 v
3 v
5 v
GND
Analog Input Pins
Microcontroller ATmega328
Operating Voltage 5V
Input Voltage (recommended)7-12V
Input Voltage (limits)6-20V
Digital I/O Pins 14
(of which 6 provide PWM output)
Analog Input Pins 6
DC Current per I/O Pin 40 mA
DC Current for 3.3V Pin 50 mA
MADE IN ITALY
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN

Breadboard Shield

- Let's plug the breadboard shield into the Arduino Uno board as shown below.



Digital inputs on the Arduino

- Each digital IO can be configured as an input. for example:

```
pinMode(4, INPUT);
```

- Input value can be read by the following command.

```
int val = digitalRead(pinNumber)
```

- The digitalRead interface can be used to read the state of the input pin

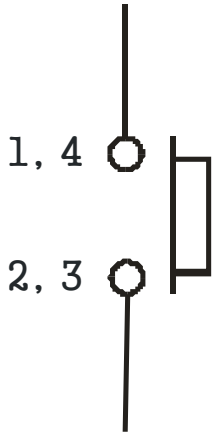
```
int val = digitalRead(4);
```

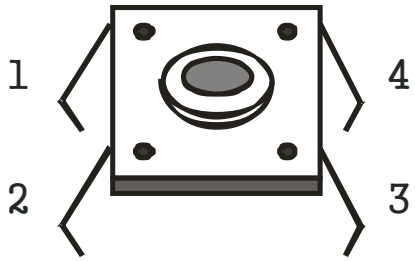
Push Button

- Computer, mouse, calculator, microwave oven, remote controller, game player, and cellular phone have push buttons.
- We can make a micro-controller act under the command input by a push button.
- The open- and closed-condition of the push button can be sensed by the micro-controller using the digital I/O ports.

The Structure of Push-Button

- The following figure shows the normally open(NO) push-button.





- The push button has 4 pins, where each 2 pins are connected to a single wire.

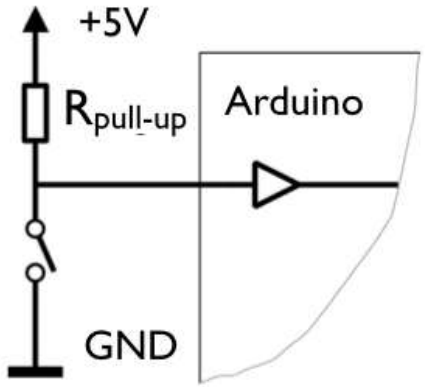
Operation of Push-Button

- Open Circuit: pins 1 and 4, and pins 2 and 3 are not connected(open). The current cannot flow.

- Closed Circuit: pins 1, 2, 3, and 4 are all connected.

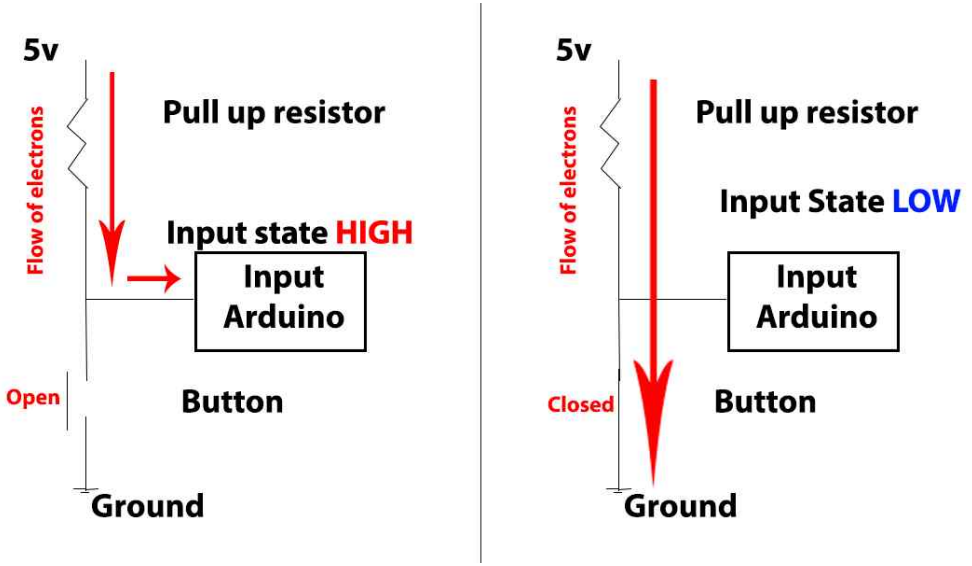
Connecting switches to Arduino

- Let us a mechanical switch.
- Button SW will be connected to pin 4.
- We will use a pull-up resistor and the following circuit for the input.



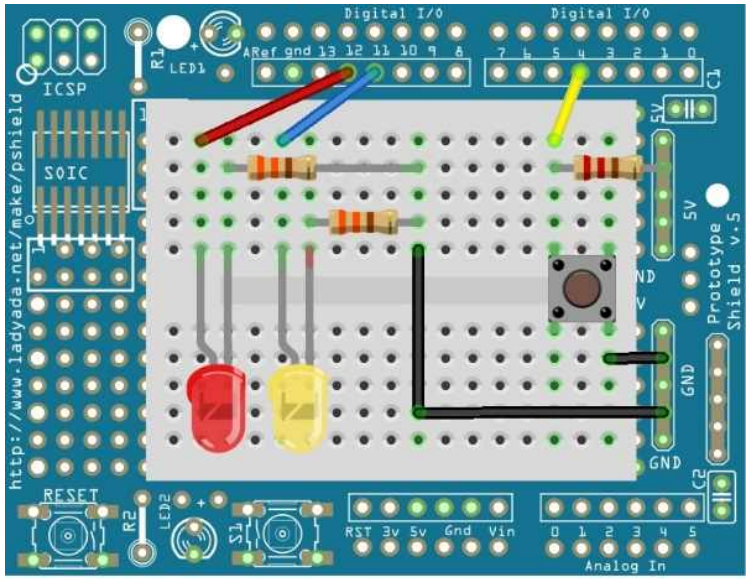
Connecting switches to Arduino

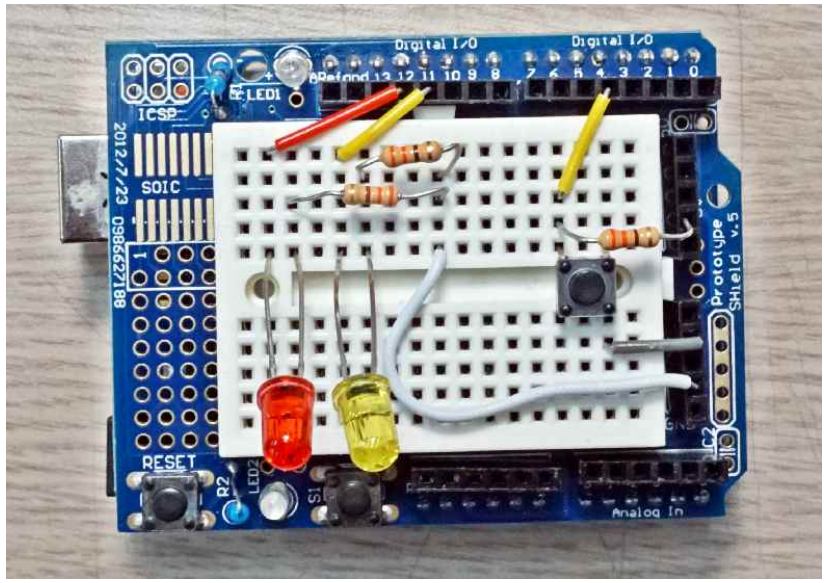
- A digital input pin is set to either high (‘1’) or low (‘0’) by connecting it to switch between the 5.0V and GND.
- In the open circuit (SW not pressed), 5V is connected to the pin.
- In the closed circuit (SW pressed), 0V is connected to the pin.



Connecting switche to Arduino

- Let’s connect the SW to the Arduino as shown below.





Push Button SW test

- Program:

```
int rLED = 11;
int yLED = 12;
int button = 4;
void setup() {
  pinMode(rLED, OUTPUT);
  pinMode(yLED, OUTPUT);
  pinMode(button, INPUT);
}

void loop() {
  int button_in = digitalRead(button);
  if (button_in == 0) {
    digitalWrite(rLED,1);
    digitalWrite(yLED,0);
  }
  else {
    digitalWrite(rLED,0);
    digitalWrite(yLED,1);
  }
  delay(10);
}
```

Implementing a digital switch input

- The state of the SW is read by

```
int button_in = digitalRead(button);
```

- The “if (button_in==0)…” statement allows the code to operate in two different ways, depending on the value of the digital input (i.e. the mechanical switch position).
- If the switch gives a value of 0, the red LED is on and the yellow LED is off. If the SW value is 1, we can see the roles of the LEDs reversed.

A Closer Look

```
if(button_in==0) {
     .
     .
     .
}
else {
     .
     .
     .
}
```

- If (condition) : if condition is true, then execute the content of { }.
- else : if condition is not true, then the execute this.